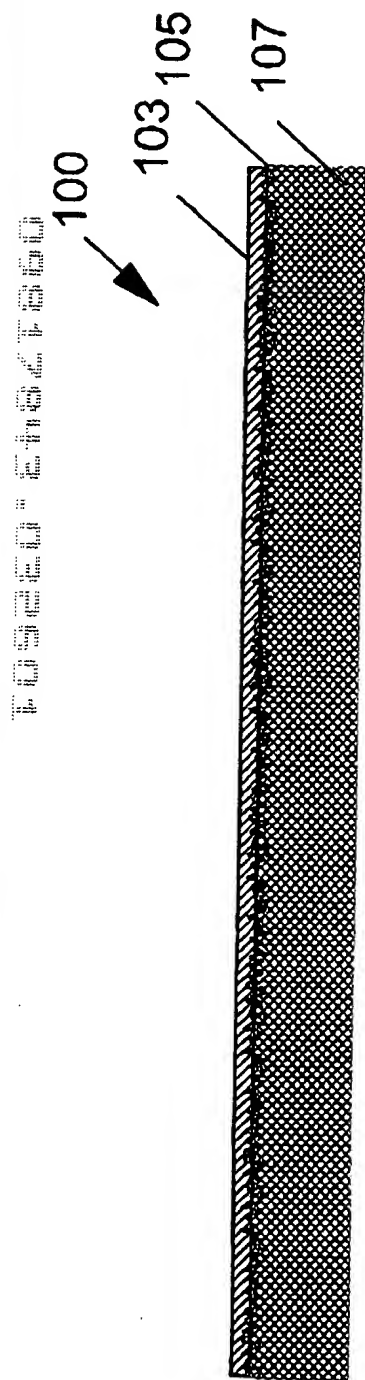


Prior art #1:

Fig. 1 Zoom of laminated copper foil to dielectric surface



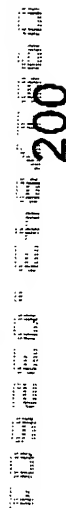
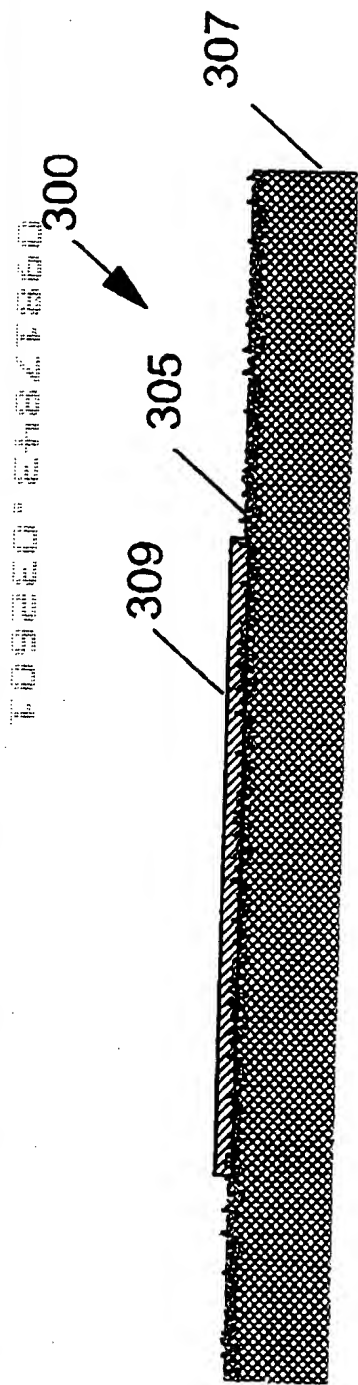
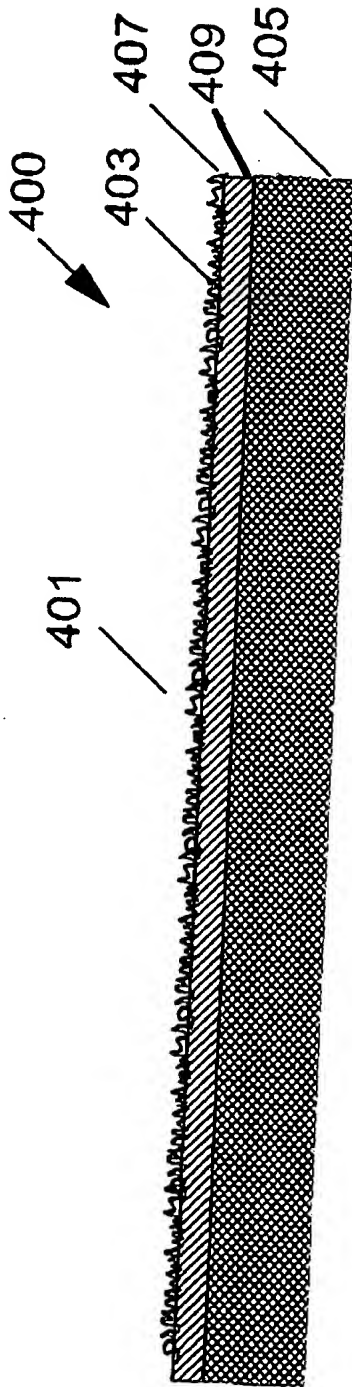


Fig. 2 Apply photoresist / expose / develop



Prior art # 1 subtractive:

Fig. 3 After etching & strip photoresist - BGA pad formed

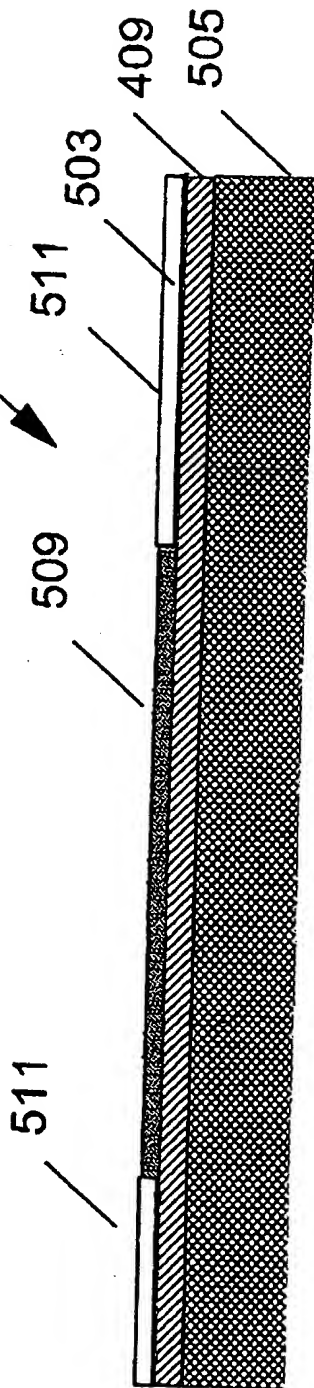


Current invention embodiment #1 subtractive:

Fig. 4 laminated copper foil to dielectric surface dendritic side up

4/19
(END000008US1)

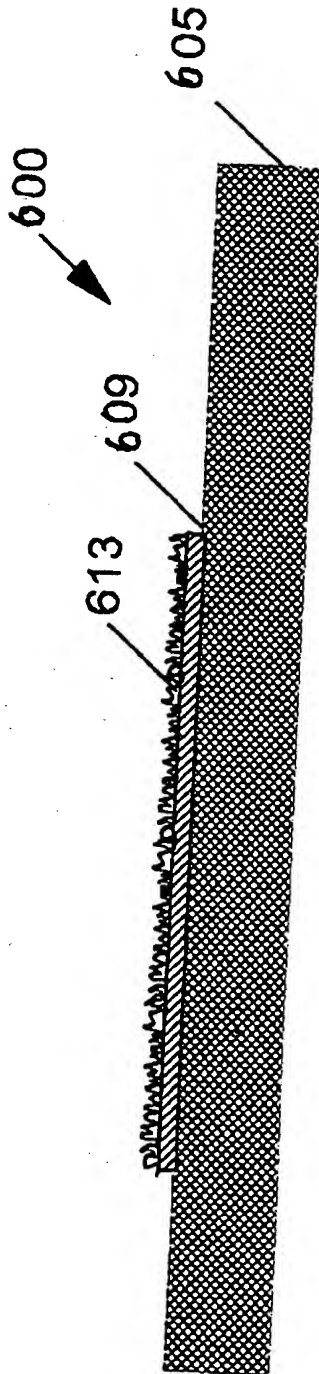
FIG. 5



Current invention embodiment #1 subtractive:

Fig. 5 Apply photoresist / expose / develop

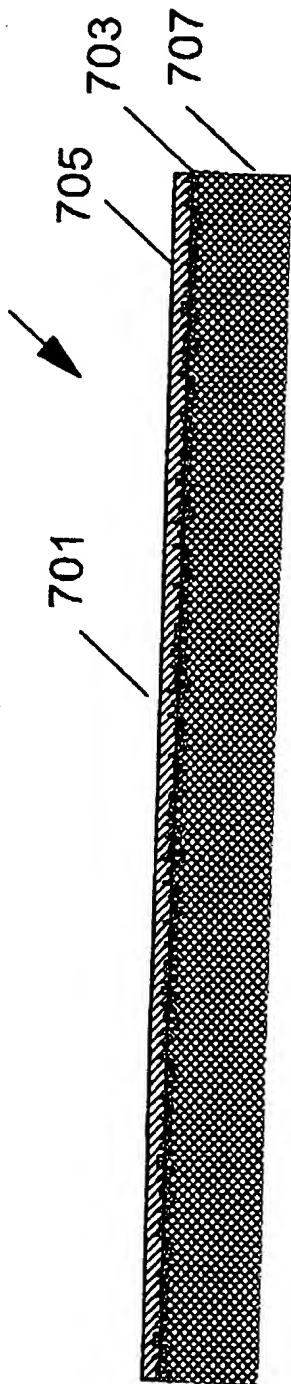
5/19
(END000008US1)



Current invention embodiment #1 subtractive:

Fig. 6 After etching & strip photoresist - BGA pad formed

FIG. 7



Current invention embodiment #2 additive pattern plate:

Fig. 7 Zoom of laminated copper foil to dielectric surface

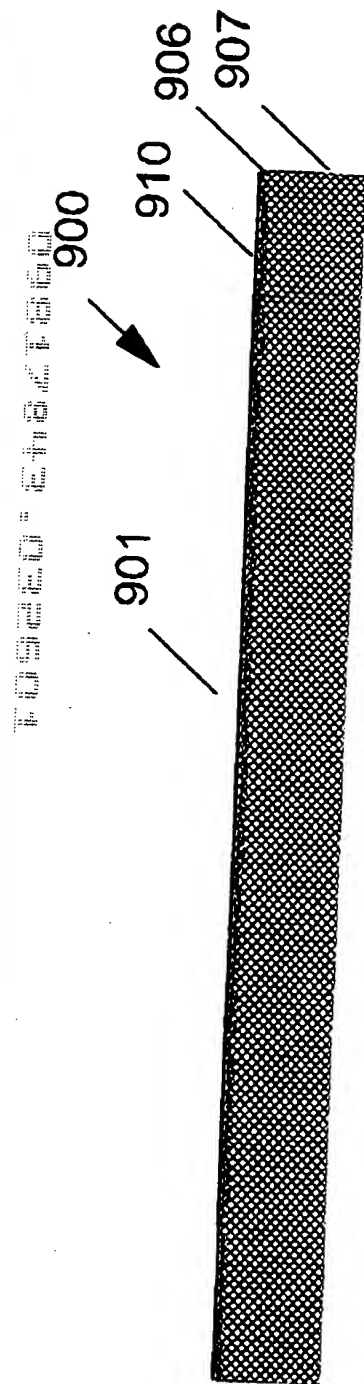
7/19
(END000008US1)



Current invention embodiment #2 additive pattern plate:

Fig. 8 Surface copper etched off

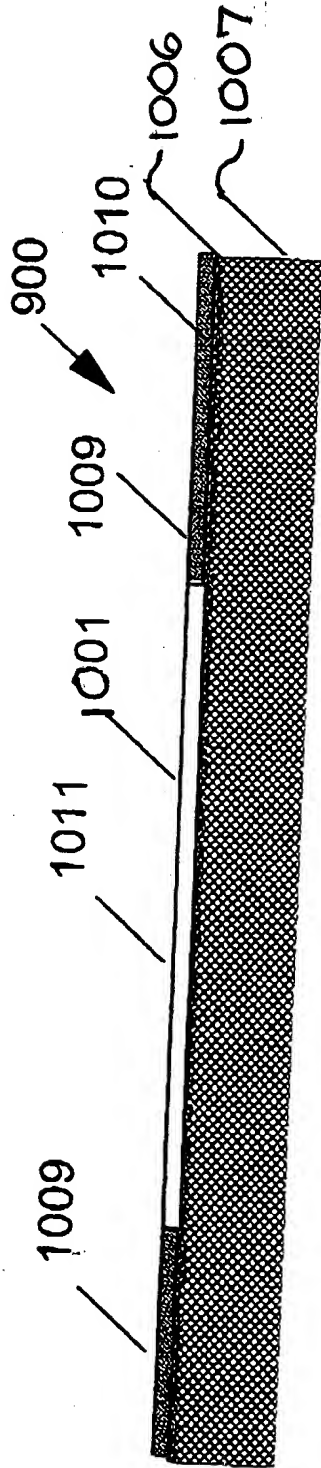
8/19
(END000008US1)



Current invention embodiment #2 additive pattern plate:

Fig. 9 Surface topography changed by plasma, vapor blasting or other chemical / mechanical attack

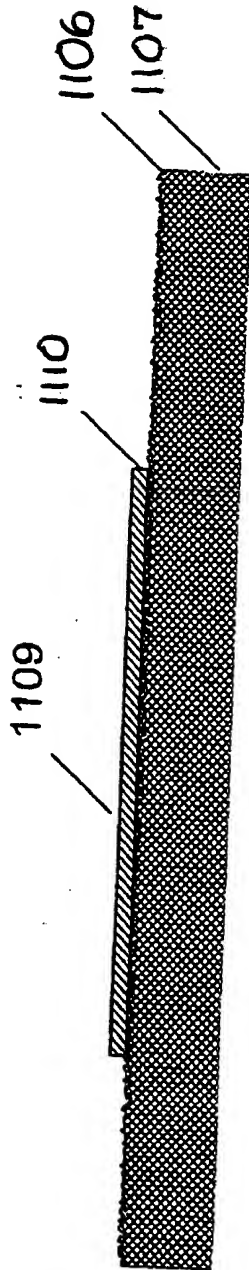
9/19
(END000008US1)



Current invention embodiment #2 additive pattern plate:

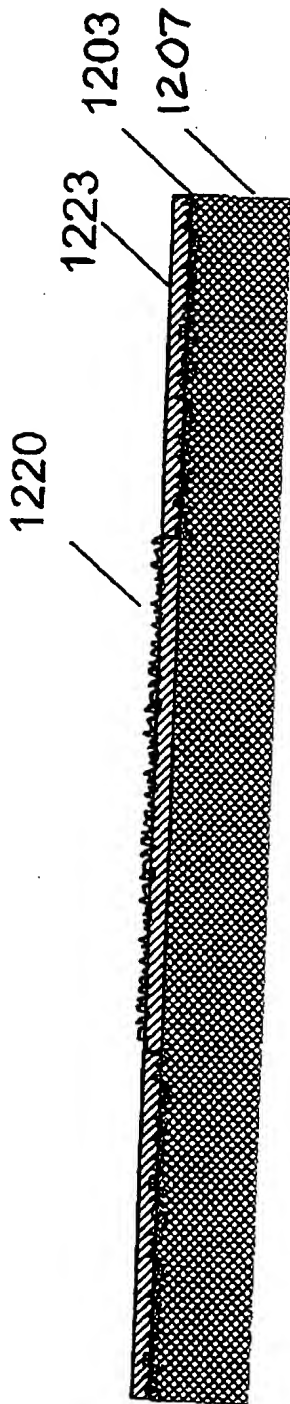
Fig. 10 Apply photoresist / expose / develop

10/19
(END000008US1)



Current invention embodiment #2 additive pattern plate:

Fig. 11 Copper plate / strip photoresist / remove catalyst layer (optional)



Current invention embodiment #3 subtractive:

Fig. 12 Zoom of laminated copper foil to dielectric surface

12/19
(END000008US1)

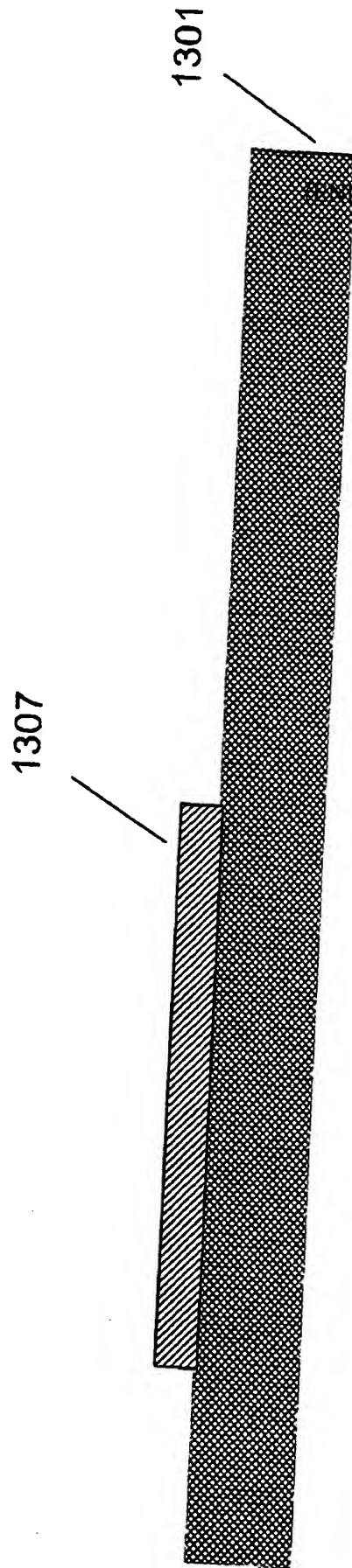


Fig. 13 - BGA 'spring-like' structure

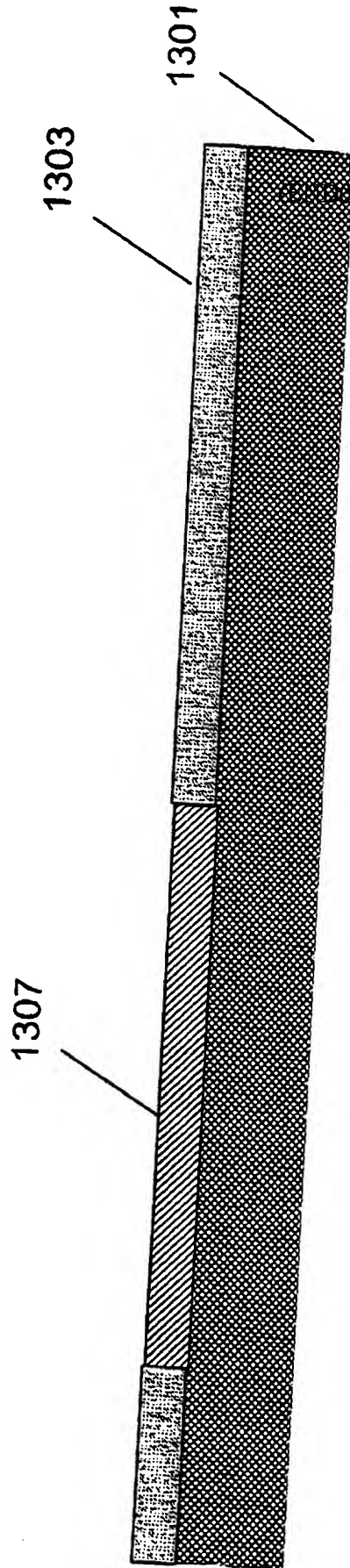


Fig. 14 - BGA 'spring-like' structure

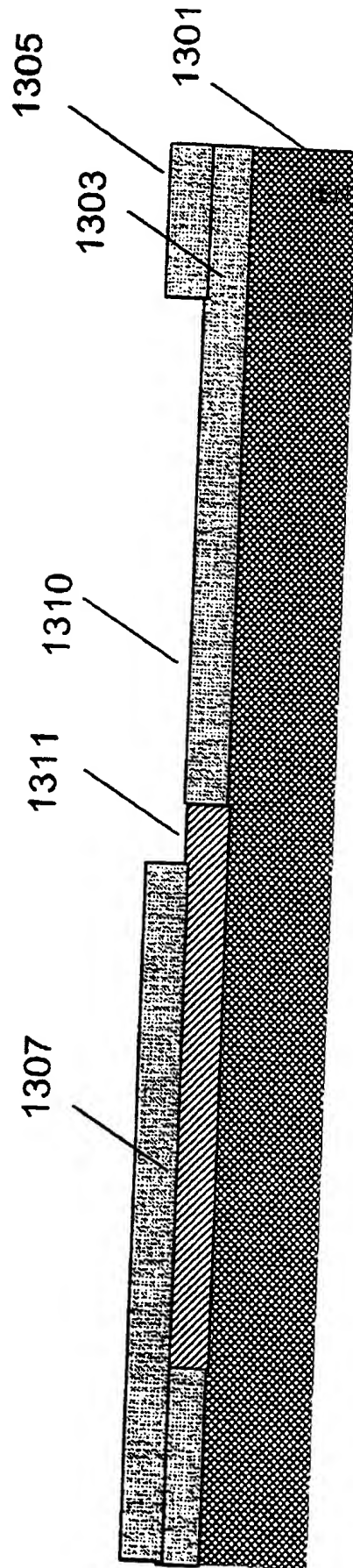


Fig. 15 - BGA 'spring-like' structure

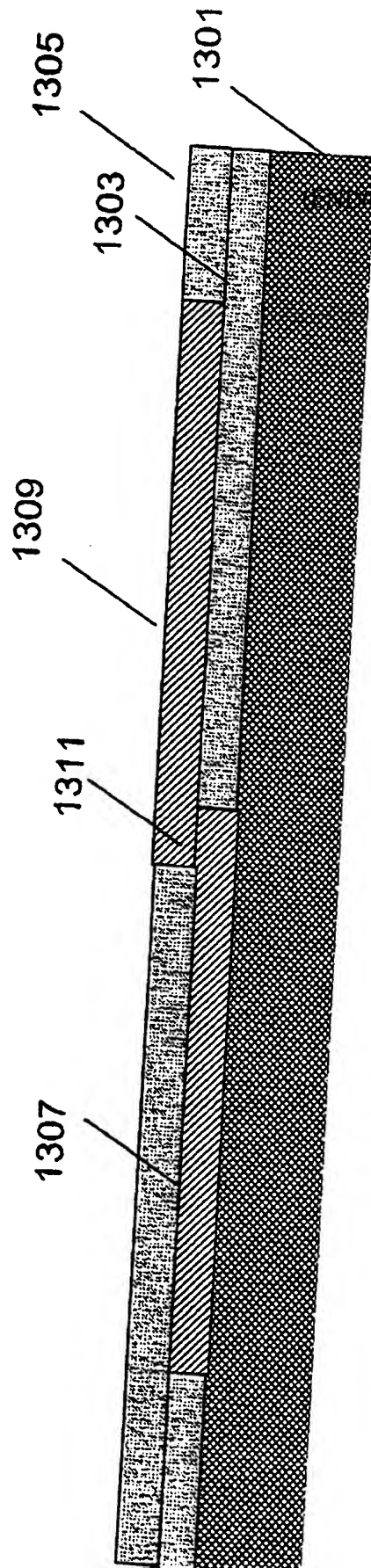


Fig. 16 - BGA 'spring-like' structure

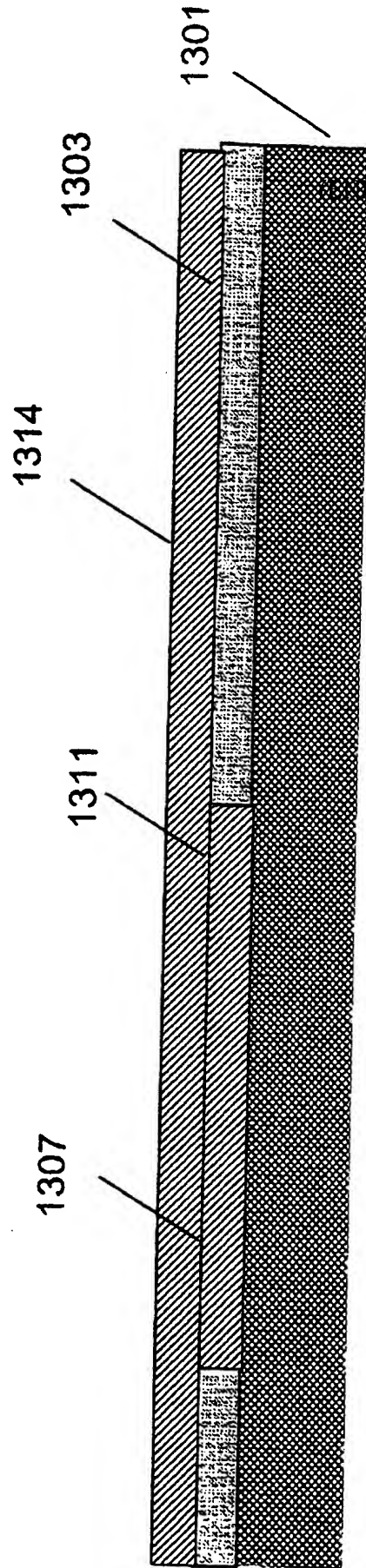


Fig. 17 - BGA 'spring-like' structure

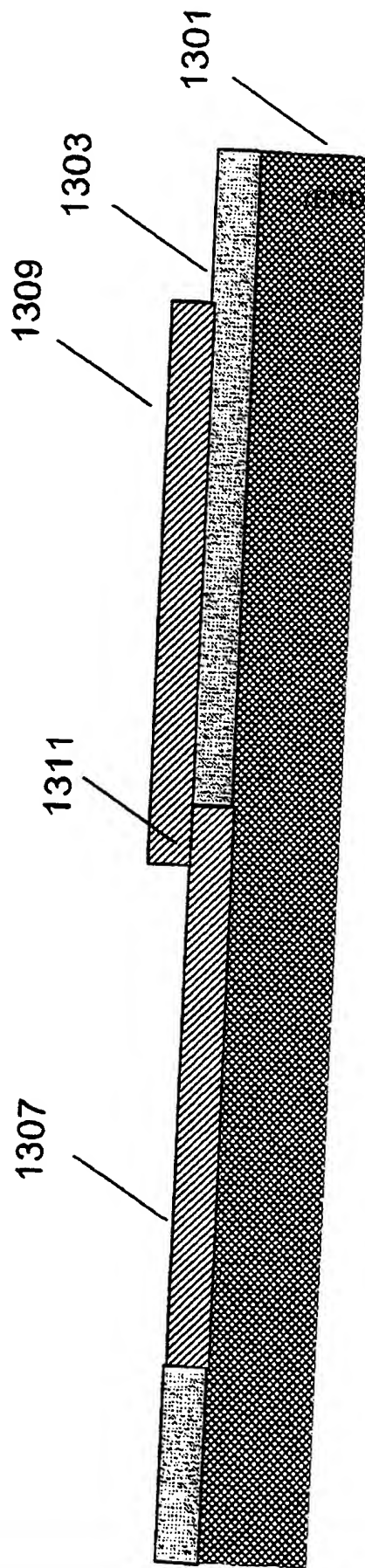


Fig. 18 - BGA 'spring-like' structure

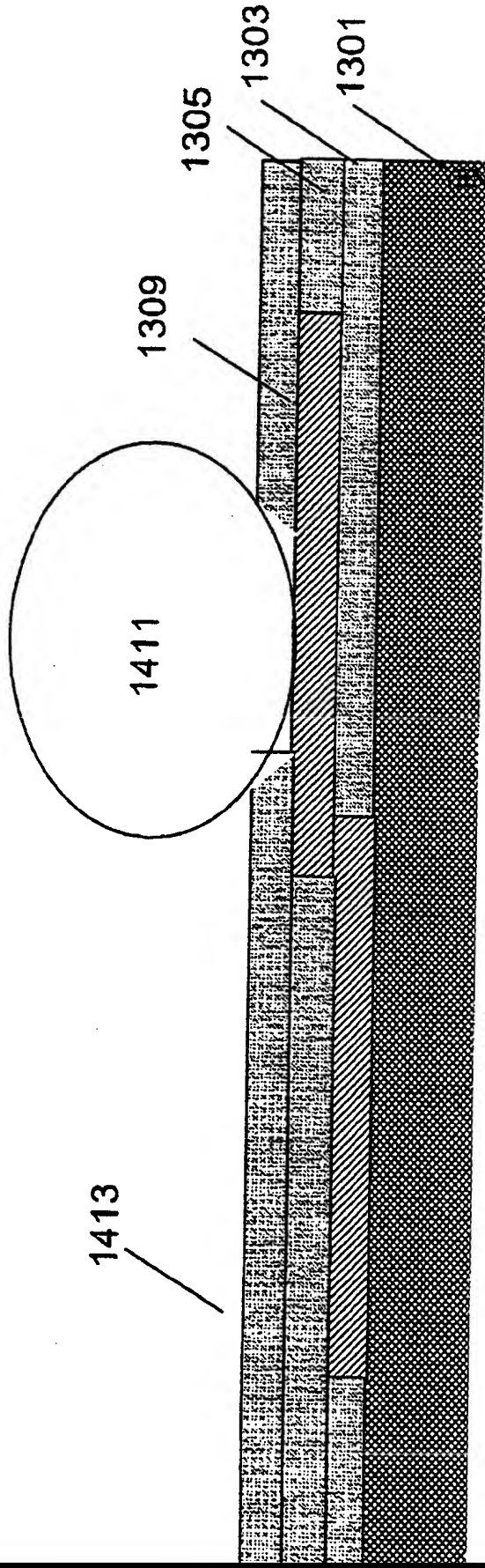


Fig. 19 - BGA 'spring-like' structure